

EXEMPLAR SOLUTIONS BIOLOGY

Chapter 2 : Human Reproduction

Class
12



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Chapter 2 Human Reproduction

MULTIPLE-CHOICE QUESTIONS

1. Choose the incorrect statement from the following:

- a. In birds and mammals, internal fertilisation takes place
- b. Colostrum contains antibodies and nutrients
- c. Polyspermy in mammals is prevented by the chemical changes in the egg surface
- d. In the human female implantation occurs almost seven days after fertilization

Solution:

Option (c) is the answer.

2. Identify the correct statement from the following:

- a. High levels of estrogen trigger the ovulatory surge.
- b. Oogonial cells start to proliferate and give rise to functional ova in regular cycles from puberty onwards.
- c. Sperms released from seminiferous tubules are highly motile.
- d. Progesterone level is high during the post-ovulatory phase of the menstrual cycle

Solution:

Option (d) is the answer.

3. Spot the odd one out from the following structures with reference to the male reproductive system:

- a. Rete testis
- b. Epididymis
- c. Vasa efferentia
- d. Isthmus

Option (d) is the answer.

4. Seminal plasma, the fluid part of semen, is contributed by.

- i. Seminal vesicle
- ii. Prostate gland
- iii. Urethra

iv. Bulbourethral gland

(a) i and ii (b) i, ii and iv (c) ii, iii and iv (d) i and iv

Solution:

Option (b) is the answer.

5. Spermiation is the process of the release of sperms from:

- a. Seminiferous tubules
- b. Vas deferens
- c. Epididymis
- d. Prostate gland

Solution:

Option (a) is the answer.

6. Mature Graafian follicle is generally present in the ovary of a healthy human female around:

- a. 5 – 8 day of menstrual cycle
- b. 11 – 17 day of menstrual cycle
- c. 18 – 23 day of menstrual cycle
- d. 24 – 28 day of the menstrual cycle

Solution:

Option (b) is the answer.

7. The acrosomal reaction of the sperm occurs due to:

- a. Its contact with zona pellucida of the ova
- b. Reactions within the uterine environment of the female
- c. Reactions within the epididymal environment of the male
- d. Androgens produced in the uterus

Solution:

Option (a) is the answer.

8. Which one of the following is not a male accessory gland?

- a. Seminal vesicle
- b. Ampulla
- c. Prostate
- d. Bulbourethral gland

Solution:

Option (b) is the answer.

9. The spermatogonia undergo division to produce sperms by the process of spermatogenesis. Choose the correct one with reference to above.

- a. Spermatogonia have 46 chromosomes and always undergo meiotic cell division
- b. Primary spermatocytes divide by mitotic cell division
- c. Secondary spermatocytes have 23 chromosomes and undergo second meiotic division
- d. Spermatozoa are transformed into spermatids

Solution:

Option (c) is the answer.

10. Match between the following representing parts of the sperm and their functions and choose the correct option.

Column I	Column II
A. Head	i. Enzymes
B. Middle piece	ii. Sperm motility
C. Acrosome	iii. Energy
D. Tail	iv. Genetic material

options:

- a. A-ii, B-iv, C-i, D-iii

- b. A-iv, B-iii, C-i, D-ii
- c. A-iv, B-i, C-ii, D-iii
- d. A-ii, B-i, C-iii, D-iv

Solution:

Option (b) is the answer.

11. Which among the following has 23 chromosomes?

- a. Spermatogonia
- b. Zygote
- c. Secondary oocyte
- d. Oögonia

Solution:

Option (c) is the answer.

12. Match the following and choose the correct options:

Column I	Column II
A. Trophoblast	i. Embedding of the blastocyst in the endometrium
B. Cleavage	ii. Group of cells that would differentiate as embryo
C. Inner cell mass	iii. The outer layer of blastocyst attached to the endometrium
D. Implantation	iv. Mitotic division of the zygote

Options:

- a. A-ii, B-i, C-iii, D-iv
- b. A-iii, B-iv, C-ii, D-i
- c. A-iii, B-i, C-ii, D-iv
- d. A-ii, B-iv, C-iii, D-i

Solution:

Option (b) is the answer.

13. Which of the following hormones is not secreted by human placenta?

- a. hCG
- b. Estrogens
- c. Progesterone
- d. LH

Solution:

Option (d) is the answer.

14. The vas deferens receives duct from the seminal vesicle and opens into urethra as:

- a. Epididymis
- b. Ejaculatory duct
- c. Efferent ductule
- d. Ureter

Solution:

Option (b) is the answer.

15. Urethral meatus refers to the:

- a. Urinogenital duct
- b. Opening of vas deferens into urethra
- c. The external opening of the urinogenital duct
- d. Muscles surrounding the urinogenital duct

Solution:

Option (c) is the answer.

16. Morula is a developmental stage:

- a. Between the zygote and blastocyst
- b. Between the blastocyst and gastrula
- c. After the implantation
- d. Between implantation and parturition

Solution:

Option (a) is the answer.

17. The membranous cover of the ovum at ovulation is:

- a. Corona Radiata
- b. Zona radiata
- c. Zona pellucida
- d. Chorion

Solution:

Option (a) is the answer.

18. Identify the odd one from the following:

- a. Labia minora
- b. Fimbriae
- c. Infundibulum
- d. Isthmus

Solution:

Option (a) is the answer.

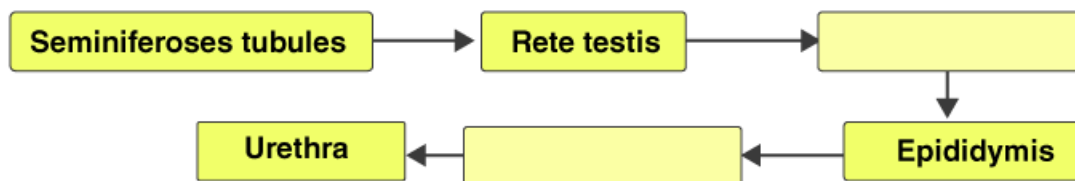
VERY SHORT ANSWER TYPE QUESTIONS

1. Given below are the events in human reproduction. Write them in correct sequential order. Insemination, gametogenesis, fertilisation, parturition, gestation, implantation

Solution:

Gametogenesis→Insemination→Fertilisation→ Implantation→ Gestation→Parturition is the sequential order.

2. The path of sperm transport is given below. Provide the missing steps in blank boxes.



Solution:



3. What is the role of cervix in the human female reproductive system?

Solution:

Cervix is the part of the female reproductive system that connects the uterus to the vagina. It allows sperms to pass and also act as a reservoir for the sperm.

4. Why are menstrual cycles absent during pregnancy.

Solution:

Gonadotropin Hormone (hCG) will start producing once a woman gets pregnant. This hormone starts developing Corpus Luteum that secretes a hormone called progesterone which maintains the thickness of the endometrium lining and prevents it from shedding. The level of oestrogen and progesterone during pregnancy results in the absence of the menstrual cycle.

5. Female reproductive organs and associated functions are given below in column A and B. Fill the blank boxes.

Column A	Column B
Ovaries	Ovulation
Oviduct	A
B	Pregnancy
Vagina	Birth

Solution:

A is Fertilization

B is Uterus

6. From where the parturition signals arise-mother or foetus? Mention the main hormone involved in parturition.

Solution:

Parturition is a term that is used to describe the delivery of baby and placenta from the mother's uterus to the outside world. Oxytocin is the principal hormone involved in parturition.

7. What is the significance of epididymis in male fertility?

Solution:

The epididymis is a coiled structure within the scrotum. Sperms mature physiologically, their motility and fertilizing capacity increases within the epididymis.

8. Give the names and functions of the hormones involved in the process of spermatogenesis.

Write the names of the endocrine glands from where they are released.

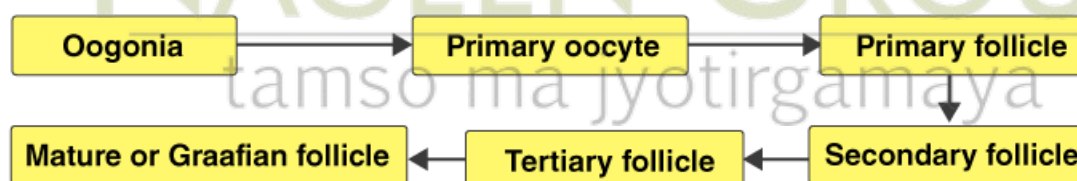
Solution:

HORMONE	GLAND	FUNCTION
1. Gonadotrophin hormone	Hypothalamus gland	It releases FSH and LH Leydig cells to release testosterone Stimulate spermatogenesis Stimulate testicular growth and production of androgen binding protein.
2. Luteinizing Hormone	Pituitary gland	
3. Androgens	Testis	
4. Follicle-stimulating Hormone	Pituitary gland	

9. The mother germ cells are transformed into a mature follicle through a series of steps. Provide the missing steps in the blank boxes.



Solution:



10. During reproduction, the chromosome number (2n) reduces to half (n) in the gametes and again the original number (2n) is restored in the offspring, what are the processes through which these events take place?

Solution:

During gametogenesis, the chromosome number ($2n$) reduces to half (n) and the actual number ($2n$) of chromosomes is restored in the offspring after fertilization.

11. What is the difference between a primary oocyte and a secondary oocyte?

Solution:

The primary oocyte is diploid and developed from oogonia whereas secondary oocyte is haploid and developed from primary oocyte through meiosis.

12. What is the significance of ampullary–isthmic junction in the female reproductive tract?

Solution:

Ovum fertilization takes place at the ampullary-isthmic junction in the female reproductive tract.

13. How does zona pellucida of ovum help in preventing polyspermy?

Solution:

Proteases destroy the protein link between the cell and vitelline membrane as well as between the receptor protein and any other sperm bound to it, hence, prevent polyspermy.

14. Mention the importance of LH surge during the menstrual cycle.

Solution:

LH or luteinizing hormone surge leads to the rupture of Graafian follicle and releases ovum into the fallopian tube. LH surge is responsible for the luteal phase in the ovarian cycle.

15. Which type of cell division forms spermatids from the secondary spermatocytes?

Solution:

In the first meiotic (meiosis I) division, the primary spermatocyte divides into two secondary spermatocytes. Each secondary spermatocyte formed, then divides into spermatids through second meiotic division (meiosis II)

SHORT ANSWER TYPE QUESTIONS

1. A human female experiences two major changes, menarche and menopause during her life.

Mention the significance of both the events.

Solution:

Menarche is the beginning of the menstrual cycle in a female's life that starts at the age of puberty and marks the attainment of sexual maturity.

Menopause is the end stage of a woman's menstrual cycle that marks the end of the reproductive stage.

2. a. How many spermatozoa are formed from one secondary spermatocyte?

b. Where does the first cleavage division of zygote take place?

Solution:

(a) Two spermatozoa are formed from one secondary spermatocyte.

(b) The first cleavage division of zygote takes place in the fallopian tube or oviduct.

3. Corpus luteum in pregnancy has a long life. However, if fertilization does not take place, it remains active only for 10-12 days. Explain.

Solution:

During pregnancy, corpus luteum releases a large amount of progesterone and oestrogen due to the neural signal given by the maternal endometrium to the hypothalamus. The embryo will be maintained until the gestation period after the release of luteinising hormone. If the fertilization does not occur, corpus luteum would not be able to remain active for more than 10-12 days because of the lack of progesterone which is required to maintain the corpus luteum.

4. What is foetal ejection reflex? Explain how it leads to parturition?

Solution;

Foetal ejection reflex is the signals given by the completely developed foetus and the placenta which causes mild uterine contractions. When the foetal ejection reflex occurs, mild uterine contractions take place. These mild uterine contractions trigger the release of oxytocin. The release of oxytocin, in turn, leads to stronger uterine contractions. This process continues until a stronger contraction leads to the expulsion of the baby through the birth canal or parturition.

5. Except for the endocrine function, what are the other functions of the placenta?

Solution:

- 1) Attaches uterus to the uterine wall.
- 2) Provides nutrients to the growing foetus.
- 3) Provides oxygen to the foetus.

6. Why do doctors recommend breastfeeding during the initial period of infant growth?

Solution:

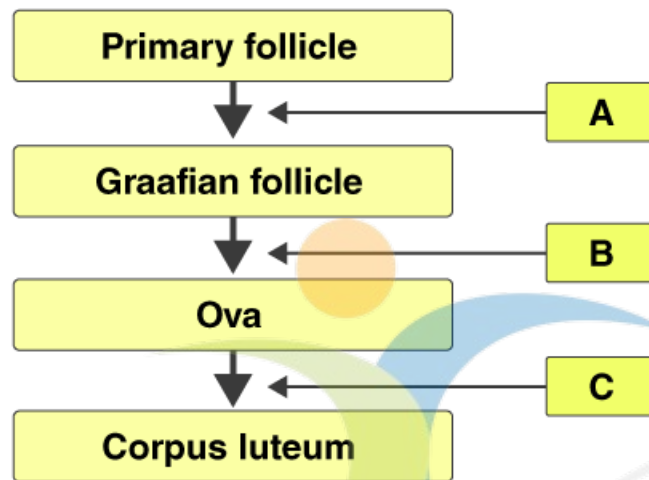
Doctors recommend breastfeeding during the initial period of infant growth because for a few days during the start of lactation, the milk produced by colostrum (the female mammary glands), is full of antibodies.

7. What are the events that take place in the ovary and uterus during the follicular phase of the menstrual cycle?

Solution:

- i. The primary follicle matures into Graafian follicle.
- ii. After this the secretion of oestrogen takes place.
- iii. The endometrium lining of the uterus regenerates through proliferation.
- iv. Shedding of the endometrium lining starts taking place.

8. Given below is a flow chart showing ovarian changes during the menstrual cycle. Fill in the spaces giving the name of the hormones responsible for the events shown.



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Solution:

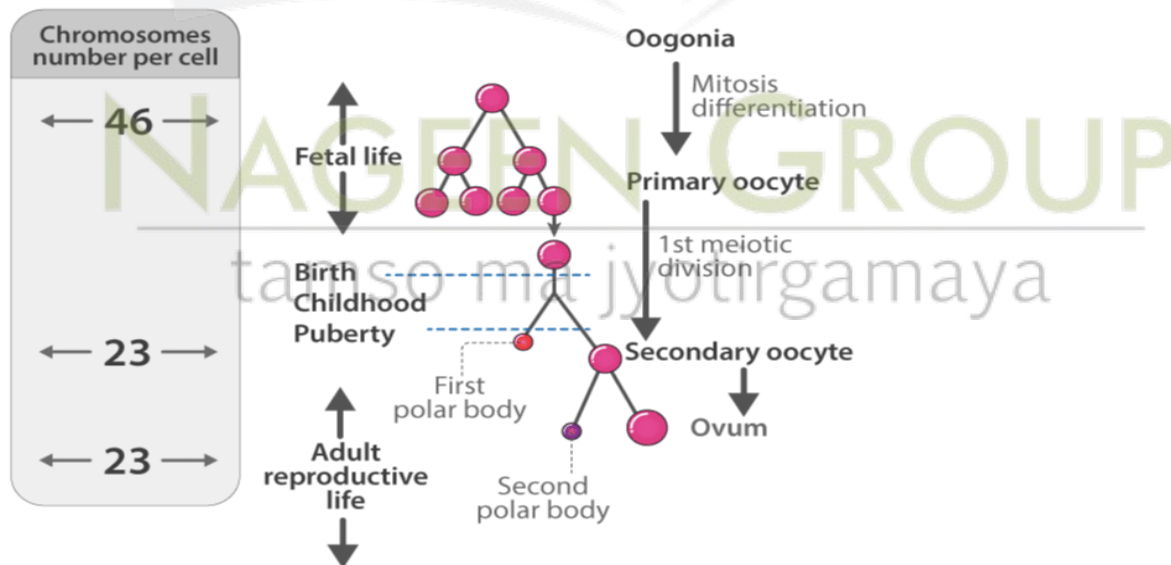
A: LH and FSH (Follicle Stimulating Hormone)

B: LH (Luteinizing hormone)

C: Progesterone

9. Give a schematic labelled diagram to represent oogenesis (without descriptions)

Solution:



10. What are the changes in the oogonia during the transition of a primary follicle to Graafian follicle?

Solution:

Germinal epithelial cells divide repeatedly to form multiple diploid oogonia and these oogonia grow to form primary oocyte. These will get surrounded by granule cells and form a primary follicle. Then it will be surrounded by the granular cells to form secondary follicle. This secondary follicle converts into tertiary follicle by adding more granulosa cells. The primary oocyte within the tertiary follicles undergoes meiotic division to form secondary oocyte and a haploid polar body. This tertiary follicle then matures into Graafian follicle which in turn, ruptures to release secondary oocyte or ovum.

LONG ANSWER TYPE QUESTIONS

1. What role do pituitary gonadotropins play during follicular and ovulatory phases of the menstrual cycle? Explain the shifts in steroidal secretions.

Solution:

The two main pituitary gonadotropins are LH (luteinising hormone) and FSH (Follicle-stimulating hormone). At the end of the menstrual cycle, the number of FSH increases that leads to the development of the follicles in the ovaries. Estrogen production increases as the follicles mature and increases LH and FSH secretions. Thus leads the ovulation and starts the formation of corpus luteum or luteinizing. Corpus luteum secretes progesterone and oestrogen which further maintains the endometrium lining.

2. Meiotic division during oogenesis is different from that in spermatogenesis. Explain how and why?

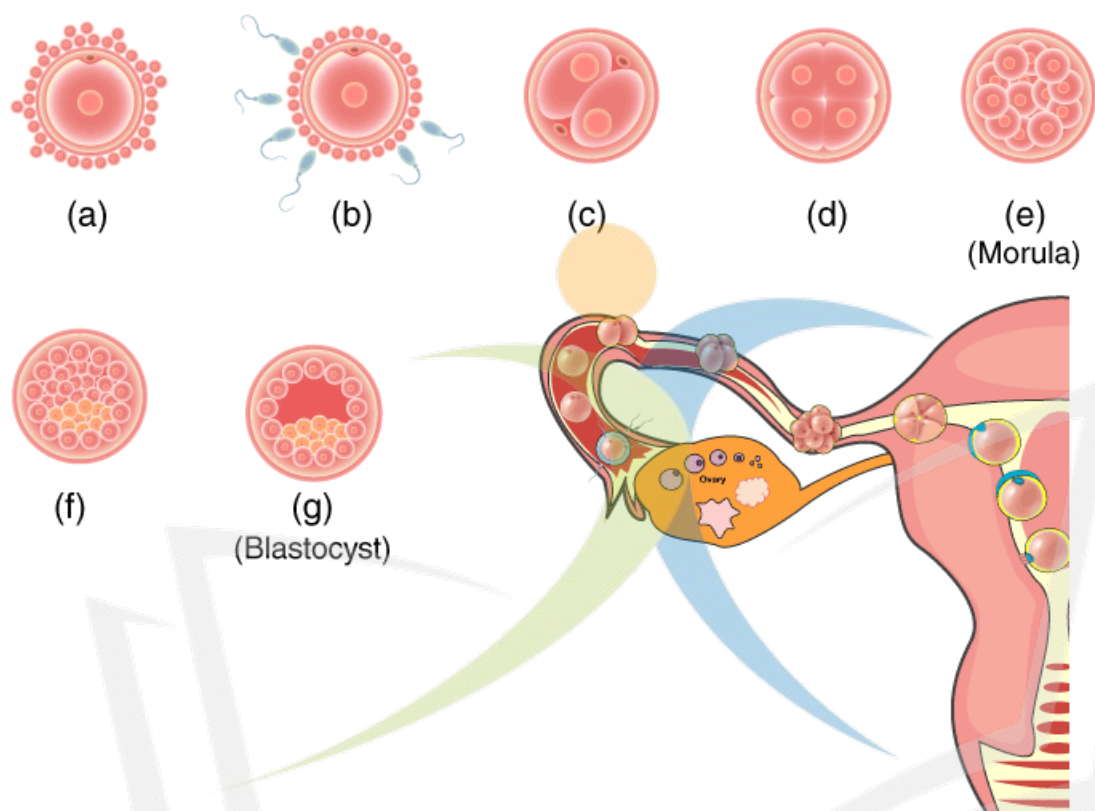
Solution:

Meiotic division during oogenesis is different from the one that occurs in spermatogenesis in terms of unequal division during oogenesis. All four spermatids formed are equally functional in spermatogenesis. The unequal division takes place in oogenesis where a major part of cytoplasm remains in one ovum only. Only a minor part of the ovum is separated as a polar body. This shows that, in spermatogenesis, all four spermatids formed are functional whereas in oogenesis only one ovum is functional.

3. The zygote passes through several developmental stages till implantation, Describe each stage briefly with suitable diagrams

Solution:

tamso ma jyotirgamaya



In the figure, 'a' shows the zygote formation after the fusion of male and female gametes and 'b' shows the entrance of zygote to the isthmus.

Cleavage stage: Within the isthmus, the zygote formed by the fusion of the male and female gamete, enters the two-cell stage known as cleavage.

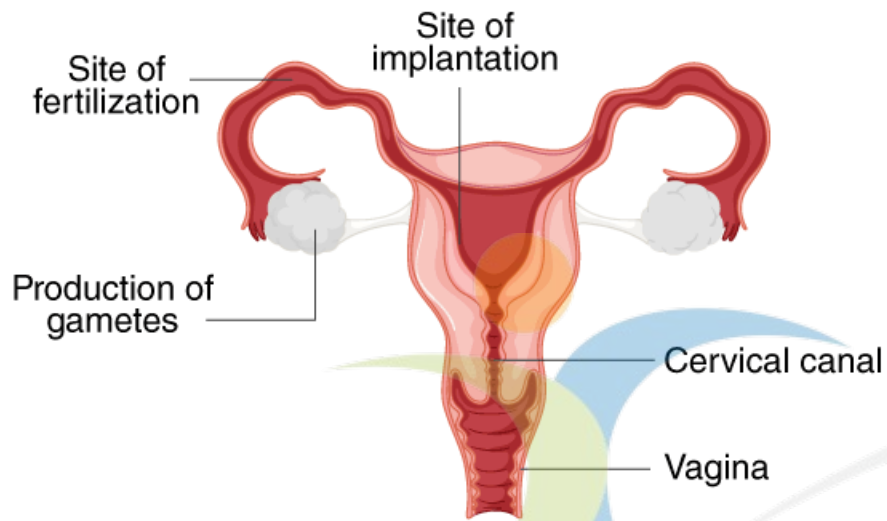
Blastomere: The cleavage formed, undergoes mitosis. At first, it forms a 2 then 4, then 8 and finally 16 cells stage. These daughter cells are called as blastomere.

Morula: The 8-16 cell blastomere are known as a morula. This morula divides continuously to form a blastocyst and moves into the uterus.

The trophoblast is the layer arranged in the blastocyst. The trophoblast layer gets attached to the endometrium lining of the uterus, the inner cells then forms an embryo after differentiation. Uterine cells divide to cover the blastocyst. Later it gets embedded in the endometrium of the uterus known as implantation.

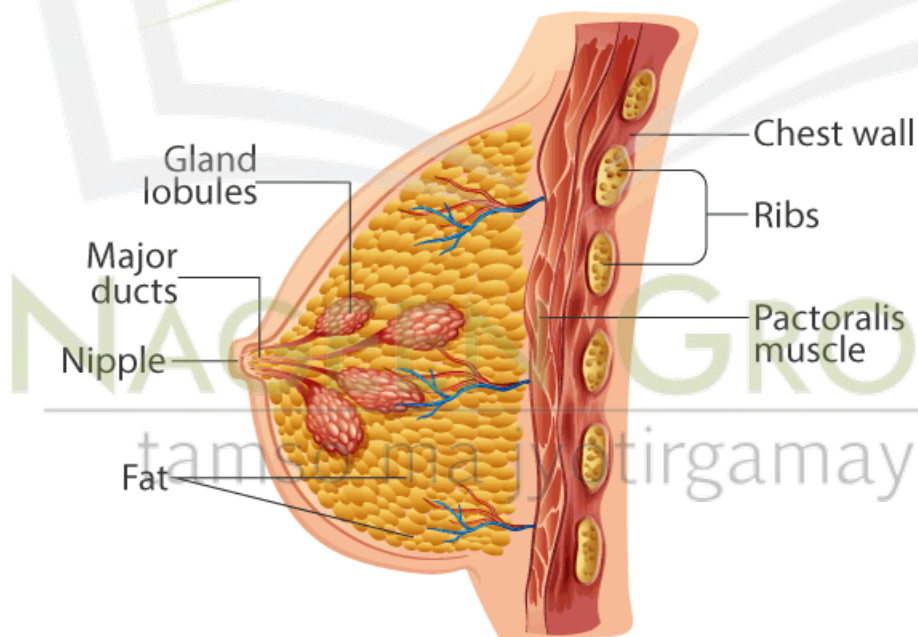
4. Draw a neat diagram of the female reproductive system and label the parts associated with the following (a) production of gamete, (b) site of fertilization (c) site of implantation and, (d) birth canal.

Solution:



5. With a suitable diagram, describe the organisation of mammary gland.

Solution:



1. The mammary gland is a paired organ which has an undeveloped duct system and adipose tissue.
2. The secretion of oestrogen and progesterone increases when a woman gets pregnant and produce milk when a glandular system in the mammary glands.

3. The glandular tissue of each breast forms mammary lobes consisting of clusters of cells known as alveoli.
4. These alveoli cells start secreting milk that is stored within the cavities of the alveoli and open into the mammary tubules and join with a duct.
5. The mammary ampulla is formed by the formation of a number of mammary ducts joining.



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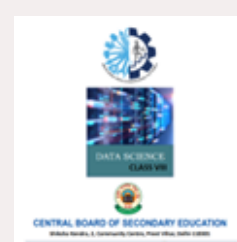
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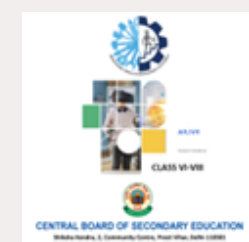
Travel & Tourism



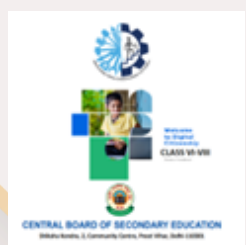
Coding



Data Science (Class VIII
only)



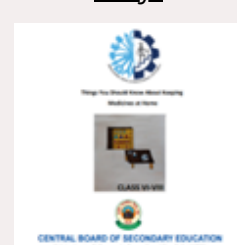
Augmented Reality /
Virtual Reality



Digital Citizenship



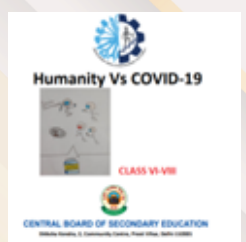
Life Cycle of Medicine &
Vaccine



Things you should know
about keeping Medicines
at home



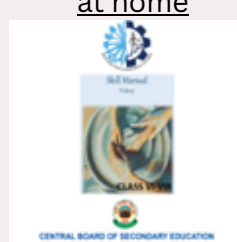
What to do when Doctor
is not around



Humanity & Covid-19



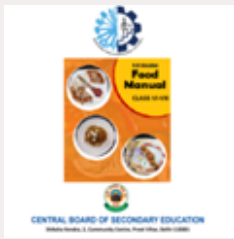
Blue Pottery



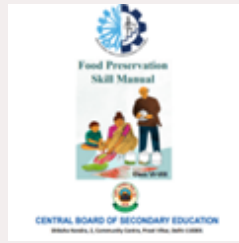
Pottery



Block Printing



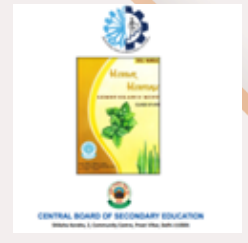
Food



Food Preservation



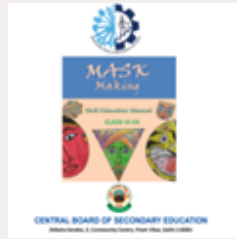
Baking



Herbal Heritage



Khadi



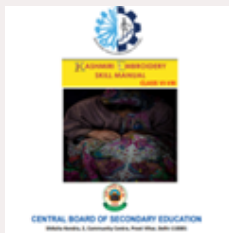
Mask Making



Mass Media



Making of a Graphic Novel



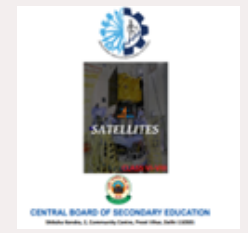
Kashmiri Embroidery



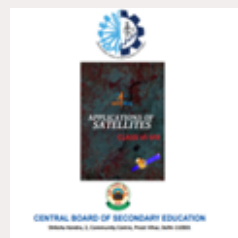
Embroidery



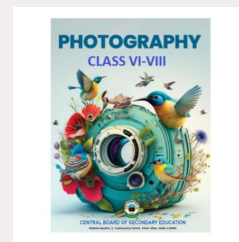
Rockets



Satellites

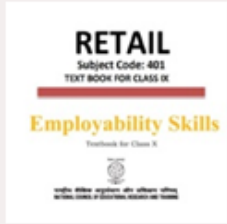


Application of Satellites

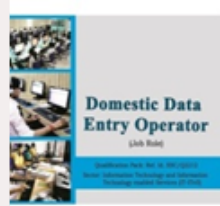


Photography

SKILL SUBJECTS AT SECONDARY LEVEL (CLASSES IX – X)



Retail



Information Technology



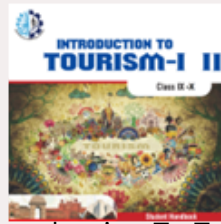
Security



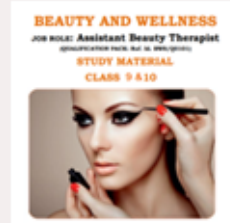
Automotive



Introduction To Financial Markets



Introduction To Tourism



Beauty & Wellness



Agriculture



Food Production



Front Office Operations



Banking & Insurance



Marketing & Sales



Health Care



Apparel



Multi Media



Multi Skill Foundation Course



Artificial Intelligence



Physical Activity Trainer



Data Science



Electronics & Hardware (NEW)

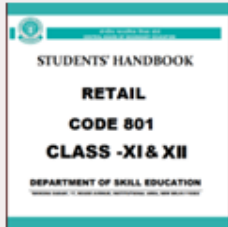


Foundation Skills For Sciences (Pharmaceutical & Biotechnology)(NEW)

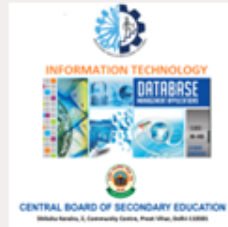


Design Thinking & Innovation (NEW)

SKILL SUBJECTS AT SR. SEC. LEVEL (CLASSES XI – XII)



Retail



Information Technology



Web Application



Automotive



Financial Markets Management



Tourism



Beauty & Wellness



Agriculture



Food Production



Front Office Operations



Banking



Marketing



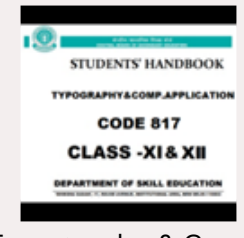
Health Care



Insurance



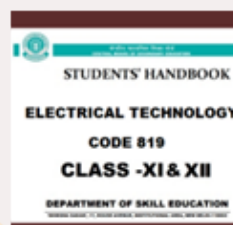
Horticulture



Typography & Comp.
Application



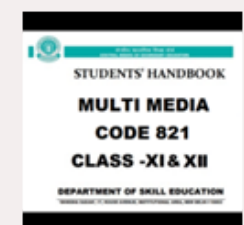
Geospatial Technology



Electrical Technology



Electronic Technology



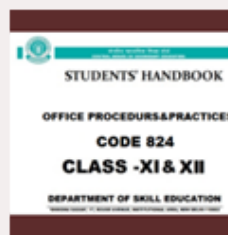
Multi-Media



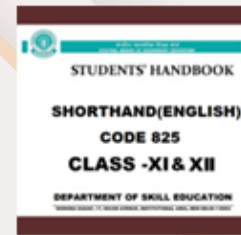
Taxation



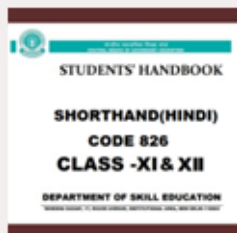
Cost Accounting



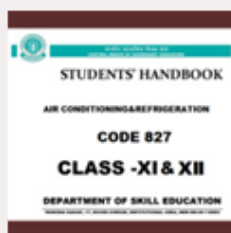
Office Procedures & Practices



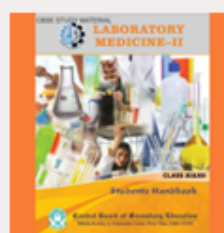
Shorthand (English)



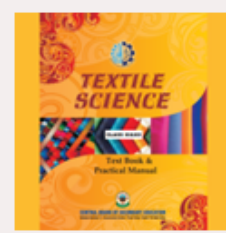
Shorthand (Hindi)



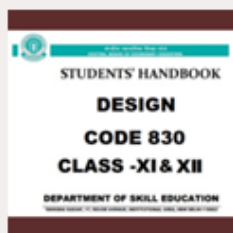
Air-Conditioning & Refrigeration



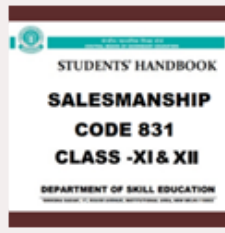
Medical Diagnostics



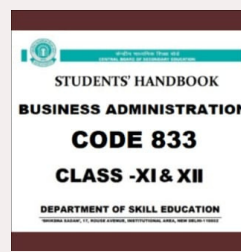
Textile Design



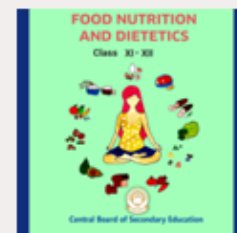
Design



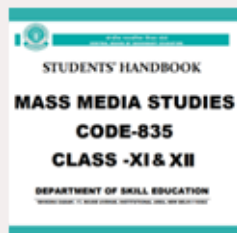
Salesmanship



Business Administration



Food Nutrition & Dietetics



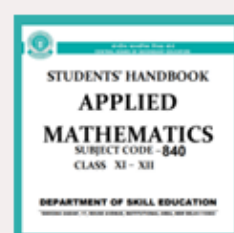
Mass Media Studies



Library & Information Science



Fashion Studies



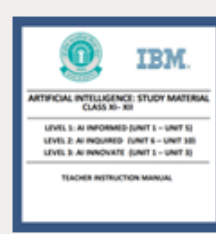
Applied Mathematics



Yoga



Early Childhood Care & Education



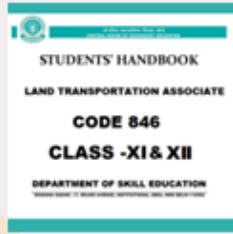
Artificial Intelligence



Data Science



Physical Activity Trainer(new)



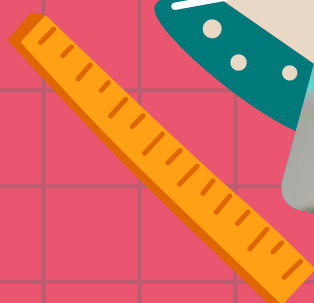
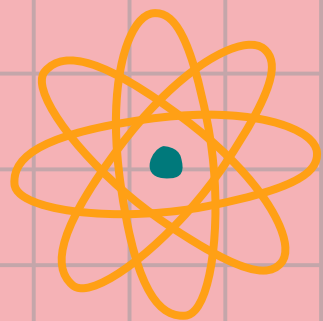
Land Transportation Associate (NEW)



Electronics & Hardware (NEW)



Design Thinking & Innovation (NEW)



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